High Flow Water Quality Management

PROBLEM: Excessive concentrations of salt and some trace elements in agricultural drainage are impairing beneficial uses of the San Joaquin River. Note this problem exists at some times and locations regardless of water year type.

GOAL: Manage water resources in a manner which will best sustain existing uses while restoring and/or not impairing others.

> Objective #1: Manage any releases made in excess of downstream consumptive needs during all years to take advantage of any surplus assimilative capacity which would result in the San Joaquin River, Mud and Salt Sloughs.
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> > Action #1: Inform individuals and agencies with an interest in salt management in advance of opportunities to dispose of salts held back for such an occasion.
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> > Action #2: Manage water deliveries in wet years to meet the crop and leaching requirements. Water in excess of these needs should be used beneficially for groundwater recharge, held in storage or applied within the basin so as to increase salt load transport efficiency.

Expanded Discussion: Soluble salts can be leached from soils with comparatively little water (0.2 to 0.4 ft./year). In areas with saline groundwater, applying excess good quality water to salty water in the rooting zone is essentially loss of water to a saline sink. In the San Joaquin basin, there are few such saline sinks, as most groundwater is hydraulicly connected with the San Joaquin River. Excess supplies in years of high runoff could be directed to areas with saline shallow groundwater to increase the gradient toward the river and mobilize accumulated salts. Additional flows could be transported down the San Joaquin River to blend with incremental groundwater flows and drain water carrying high loads of selenium, boron and other dissolved solids.

Proper management of wet-year water resources would help to prevent crop and wildlife toxicity as well as prevent reverse flows in the South Delta, and provide positive downstream flows to improve survival of anadromous fish. Physics-based computer models now being developed can help determine the most efficient pattern of water application and instream flow to best mobilize salts.

Recommendation: The SJRMP Advisory Council should work for a consensus that it is in everyone's interest to use measures which would improve uniformity of application of water, in a manner which takes salt management into consideration. Measures include subsidize better application methods, charge fees to saline dischargers for discharges in excess of crop needs and leaching needs, remove contractual obstacles to optimum use or otherwise incorporate water quality and other environmental costs into the cost of irrigation. The optimum use pattern in wet years may differ from the optimum pattern in other years, and the flexibility to respond to these opportunities needs to be more widely recognized and built into the water management system.

This consensus building can be undertaken immediately, and need not wait for other actions. To the extent that institutional factors such as existing contracts create an impediment to more uniform distribution of irrigation water, and more adaptive management of wet-year supplies, all parties need to agree that there are no objections to removing those impediments. There is no significant cost to this recommendation. Development of physics-based computer models which would guide more effective management of wet-year (and dry-year) supplies is already proceeding, but may require additional financial support with potential funding from EPA, USGS and SWRCB. The Advisory Council should endorse continued funding by these agencies for basin-wide models which integrate surface water flows and quality with groundwater flows and quality.

PROBLEM: Excessive concentrations of salt and some trace elements in agricultural drainage are impairing beneficial uses of the San Joaquin River.

GOAL: Manage quality of existing water resources in a manner which will best sustain existing uses while restoring and/or not impairing others.

> Objective #1: Manage irrigation supplies during wet years to take advantage of surplus assimilative capacity in the San Joaquin River, Mud and Salt Sloughs.
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> > Action #3: Route additional wet year flows and flood releases down the San Joaquin River and its historic channels.

Expanded Discussion: Fisheries, Water Supply, Flood Protection and Wetland/Wildlife Subcommittee members were asked to review and augment the attached summary and recommendation. The Flood Protection Subcommittee has already responded to recommend that this proposed action be deleted, which is an indication that a consensus on re-routing flood releases will not be easy to reach.

During the flood season, when Millerton Lake is above its flood reservation elevation, excess flows are generally routed down the Friant-Kern and Madera canals to their CVP service areas, while minimal releases are made to the channel. The reach of the San Joaquin River from Gravelly Ford to Mendota Pool is ordinarily dewatered and the reach from Sack Dam to the re-entry point of Eastside Bypass flows is supplied with only seepage or tailwater flows from Delta-Mendota Canal supplies. The result is too much or too little riparian vegetation, and poor water quality.

As a result of the infrequency of scouring or channel-forming flows, riparian vegetation has encroached on the floodway, and in the lower reaches below Sack Dam. The overgrowth increases the risk of flooding by reducing channel capacity. Flood damage to bridge structures and other facilities in the channel could be aggravated by debris jams of uprooted trees when the eventual high water occurs.

Because the channel below Gravelly Ford is now usually dry, essentially no riparian vegetation exists. Silt and sediment from this unvegetated lower reach below Gravelly Ford will be readily eroded and transported downstream by flood flows to impair water quality and reduce the volume in Mendota Pool. More frequent high flows in the channel would reduce the encroachment in the upper reach, result in more early stages of riparian growth and a more diverse riparian habitat. Continuous flow clear to Mendota Pool would improve water quality by adding a riparian canopy and stabilizing the banks against scour. Maintenance costs would possibly increase on a yearly basis, but structure damage during a major flood might be reduced.

During very wet years such as 1969, 1982, 1983, excess flows down the Friant-Kern Canal contribute to flooding in the Tulare Lake Basin. Years of high flows are also a problem for the lower San Joaquin Valley, where levee failure and seepage damage to crops both occur regularly. This proposal needs consideration by the Flood Protection Subcommittee as well as interested parties from the Tulare Lake Basin to ensure that the high San Joaquin River and Kings River flows are applied and distributed in such a way that they would not increase the height or duration of sustained high water surface elevations. High water levels have in the past precipitated levee failures and seepage damage in the lower reaches of the Valley.

Flood flows transported down the channel could be applied in lieu of more saline Delta-Mendota Canal Water to wetlands and/or cropland with water quality benefits (see Action #1, above).

This concept of returning flood water to its historic path is intended to address a salinity problem in the San Joaquin Valley, but a reduction in total flow reaching the Tulare Lake Basin would alter the opportunity for overdraft reduction and salt management in that basin. Responsible parties and water right or contract holders in the Tulare Basin may benefit from the reduction of Tulare Lake flooding which could result from routing San Joaquin flows down the historic channel. This benefit must be weighed against the loss of high quality San Joaquin River water which might be used for groundwater recharge or other beneficial uses in preference to a San Luis Reservoir source.

Recommendation: The SJRMP Advisory Council should provide a forum for parties interested in routing wet-year flows into the historic San Joaquin channels to consult with Tulare Basin interests. These interest groups need to determine whether they are willing to help one another find an operation schedule for Friant flood releases that is mutually beneficial. This can begin immediately at no cost except the commitment of time by interested parties.

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GOAL: Manage quality of existing water resources in a manner which will best sustain existing uses while restoring and/or not impairing others.

Objective #2: Manage flood control facilities during wet years to create and/or take advantage of assimilative capacity in the San Joaquin River.

Action #4: Manage end-of-year releases after wet years to make best use of waters released in the fall to meet flood-storage reservation requirements prior to flood season.

Expanded Discussion: Flood Protection, Water Supply and Fisheries subcommittee members seem most able to address this issue.

The Fisheries and Water Supply subcommittees recognize that some autumn flow releases must be made in wet years to comply with flood control operations. These flows are sometimes considerable, and potentially attract salmon by permitting stream water from their birthplace to reach the Delta. The chemical clues from their home stream permit anadromous fish to more successfully find their spawning areas. The releases are largely accomplished through hydroelectric facilities, so power supplies may be temporarily more abundant.

This may also be viewed as a relatively brief period of increased assimilative capacity which might be better coordinated with drainage discharges. Drainage discharges are normally at a seasonal minimum in fall when little irrigation water is needed by plants. This might be an opportunity to pump saline groundwater from the shallow unconfined aquifer, or pump salty water from detention basins. At such times, there is a more abundant power supply, needed to do pumping, and a low-salinity flow which must be released for flood safety reasons. Increased flows of mixed origin could increase fish attraction and improve passage, as well as more effectively transport salt out of the basin.

The increase in releases and salinity from pumped groundwater might be coordinated with export curtailment if any pumping is actually underway at that time, so that salts could actually leave the basin rather than be recirculated. This might not be necessary if Delta barriers designed to route San Joaquin flows past the South Delta prove effective. Higher sustained base flows during the fall following wet years might permit the replacement of exports foregone after the brief curtailment by increased export pumping over the remainder of the year.

If saline water from the unconfined alluvium could be successfully pumped down to the point where accretions actually stopped, the quantity of refluxed salt should be reduced, during the rest of the export season, to the long-term benefit of the basin salt balance.

Recommendation: The Advisory Council should ask USBR or another party to review historical releases. They could complete an operation study to determine how much water is released and how often it is available to see whether a significant salt transport opportunity exists or could be further developed with a pumpdown system.

While an operation study is made, there is a need for coordination among reservoir operators, fisheries agencies, exporters and drainage managers. The SJRMP Advisory Council, Resources Agency or SWRCB could all provide such a forum in the event a wet year occurs. There will always be a role for a coordinating entity, and the Advisory Council should support the designation of and funding for staff of an agency assigned to do this job.

Studies by USBR may take several man-months and development of new operation models at a cost of perhaps $200 thousand. Coordination of releases by reservoir operators and fishery managers is ongoing, but could be expanded immediately if an effort is made to involve other potential beneficiaries through contacts with the Advisory Council.

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Action #5: Manage leveed areas such as the Eastside Bypass, mouth of Bear Creek, or other potential wetlands for additional off-channel storage and winter waterfowl habitat, with detained water available to augment assimilative capacity of the San Joaquin River, Mud and Salt Sloughs, and reduce seepage damage and flood threats attributable to high stages on the River's lower reaches.

Expanded Discussion: Representatives of Wetlands/Wildlife, Flood Protection and Water Supply subcommittees are best able to comment on this concept.

A substantial amount of uncultivated, flood-prone land exists within and adjacent to parts of the San Joaquin River Flood Control System, particularly outboard of the Eastside Bypass levees and near the confluence of Bear Creek with the San Joaquin River. Floodwaters could be diverted into these areas and detained, and the impounded water remaining could contribute to assimilative capacity later in the season when stormflows recede. The volume of water which might be stored, and time of year it would be available seem to match the need for water for blending. We expect these areas would be of greatest value for storage of rainstorm floods which occur most often in mid-winter. Temporary storage and release at that time would be valuable because it would add to assimilative capacity when tile drain flows are peaking.

Flooded areas would supplement winter waterfowl habitat and recharge shallow unconsolidated aquifers which might be pumped or contribute to accretion flows entering the San Joaquin from the East in late spring and summer. These accretions, of high assimilative capacity, would arrive when flows in the channel receded later in the spring, and might contribute to more stable water temperature through the summer. If the shallow groundwater could be pumped, the system could operate in a conjunctive use mode to stabilize or extend water supplies.

The operation of the areas for flood control purposes would be confined to wet years and/or periods when the SJR levee system is at the warning stage or higher, or as necessary to permit emergency repairs in case of failures. At other times the areas would be operated to provide other beneficial uses such as wetland habitat, groundwater storage and withdrawal, endangered species restoration, rotational grazing, or other uses accepted by a consensus.

Recommendation: Following evaluation and support by other subcommittees, the Advisory Council should encourage the Reclamation Board and interested local agencies to acquire sufficient easements and build structures on lands in the described areas to operate them as an integral element of the San Joaquin River Flood Control System as well as part of the National Wildlife Refuge System. Acquisition costs would be substantial, but the multiple objective nature of such a purchase should spread the costs and benefits over a wide number of agencies.

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Objective #3: Manage runoff in the San Joaquin River Basin from the Coast Range to ensure that significant unregulated water supplies from precipitation are prudently used.

Action #6: Adjust land use and ownership of agricultural operations on the West side of the San Joaquin Valley to ensure that stormflows are distributed and infiltrated where the rain falls, or as close to the source as possible.

Expanded Discussion: Wetlands/Wildlife, Water Supply and Flood Protection subcommittees need to address this idea.

Wet year runoff from the Coast Range, and cultivated lands on the West side of the San Joaquin Valley often has no non-damaging course to the River. Old watercourses have been effectively obliterated. When significant runoff events do occur, the surplus water, rather than being absorbed on the alluvial fans, flows over cultivated land, where it picks up high levels of sediment pollution. It then flows through roadside borrow ditches or along upslope berms of irrigation channels and sometimes causes flood damage such as in the town of Mendota.

In years wet enough to produce significant runoff, salinity of these surface flows is relatively low, even though high levels of sediment are picked up when flows cross cultivated land. The runoff could be used beneficially for additional assimilative capacity if some way could be found to increase ground infiltration and retard the delivery of this sediment-free water to the San Joaquin. This water is only rarely available, so it appears unreasonable to establish a dedicated facility for its storage, although it might be wise to establish dedicated drainage ways. These could be managed as large or small grassed swales extending from the mouths of all Coast Range canyons, to areas where water could be economically impounded such as waterfowl clubs. Landowners on the conveyance routes could be paid for an easement to maintain these swales out of cultivation. The uncultivated swales would capture and immobilize sediments which might otherwise reach the river and impair its quality an hydraulic capacity.

Recommendation: The Advisory Council should identify by consensus those corridors through which the Department of Water Resources and Reclamation Board should acquire flowage and impoundment easements. The Reclamation Board would undertake to condemn any drainage ways or impounding areas where sellers were unwilling to sell the easements needed.

As a supplement to acquisitions oriented toward flood control, the Advisory Council should support funds for and urge the Department of Fish and Game and Wildlife Conservation Board to identify and attempt to buy, from willing sellers, sufficient interests in drainage courses and impoundment areas needed to provide wildlife corridors from the Coast Range to the San Joaquin, and manage habitat along those corridors to encourage sediment capture and infiltration of runoff.